USA TROUGH PROJECT

THERMAL STORAGE ANALYSES FOR RANKINE CYCLE AND COMBINED CYCLE POWER PLANTS

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THERMAL STORAGE APPLICATIONS

1 T0 2 HOUR CAPACITY FOR CLOUD TRANSIENTS

3 TO 6 HOUR CAPACITY FOR MATCHING PEAK DEMAND

6 TO 12 HOUR CAPACITY FOR INCREASING PLANT CAPACITY FACTOR

SCOPE OF STUDY

REVIEW OF PREVIOUS STUDIES AND RECENT LITERATURE

EVALUATION OF CANDIDATE STORAGE MATERIALS

DESIGN AND ANALYSIS OF 2 RANKINE CYCLE POWER PLANTS WITH 3 HOURS OF STORAGE

DESIGN AND ANALYSIS OF 3 INTEGRATED SOLAR - COMBINED CYCLE POWER PLANTS WITH 1.5 AND 8 HOURS OF STORAGE

STORAGE MATERIALS EVALUATION

LIQUID MEDIA: HOT AND COLD TANK

- **MINERAL, SYNTHETIC, AND SILICONE OILS**
- **BINARY AND TERTIARY NITRATE SALTS**
- **BINARY NITRITE SALTS**

SOLID MEDIA: THERMOCLINE

- **CONCRETE**
- **REFRACTORIES**

- **SODIUM CHLORIDE**

MATERIAL EVALUATION (Continued)

DUAL MEDIA: THERMOCLINE

- **OIL AND SAND (OR ROCKS)**
- **OIL AND IRON (OR STEEL)**

PHASE CHANGE MATERIALS

- **EUTECTIC SALTS**
- **HYBRID SALT/CERAMIC MEDIA**

EVALUATE TEMPERATURE RANGES, THERMAL PROPERTIES, UNIT STORAGE COSTS, AND DEVELOPMENT STATUS

RANKINE CYCLE STORAGE SYSTEM DESIGN AND ANALYSIS

SELECT OPTIMUM STORAGE CONCEPT FOR RANKINE CYCLE POWER PLANT

DESIGN 3 HOUR STORAGE SYSTEMS FOR HYPOTHETICAL PLANTS IN BARSTOW AND CRETE

DETERMINE DAILY AND ANNUAL PLANT PERFORMANCE USING PILKINGTON RANKINE CYCLE AND FIELD PERFORMANCE MODELS

INTEGRATED SOLAR - COMBINED CYCLE STORAGE SYSTEM DESIGN AND ANALYSIS

SELECT OPTIMUM STORAGE CONCEPT FOR ISCCS PLANT

DESIGN 1.5 AND 8 HOUR SYSTEMS FOR 3 HYPOTHETICAL PLANTS AT BARSTOW

- **HIGH SOLAR FRACTION (15 TO 20 PERCENT)**
- **LOW SOLAR FRACTION (1 TO 3 PERCENT)**
- **ORIGINAL ISCCS CONCEPT (DOUBLE STEAM TURBINE CAPACITY)**

DETERMINE DAILY AND ANNUAL PERFORMANCE USING GateCycle COMBINED CYCLE PERFORMANCE MODEL AND PILKINGTON FIELD PERFORMANCE MODEL